Transportation (GDOT), is a system designed to provide enterprise-wide access to a large collection of both spatial and tabular GDOT data. TSAF is designed as a relational database and implemented in an Oracle® database which houses the TSAF data, maintenance routines for maintaining this data, and data service routines that provide access to this data over the GDOT intranet through a Web browser. While this configuration is typical for enterprise-wide database systems, TSAF must meet a number of other requirements that differentiate TSAF from most other enterprise-wide database systems.

[0010] The GDOT TIS is designed to be a single repository for road network data. TIS will include data for the TSAF and for TPro. The capability to store and retrieve both relational and spatial data must include both GDOT roadways and multi-modal assets. A multi-modal asset is a facility that is related to both a road network and another transportation system (e.g., a park and ride facility). In the example, a park and ride location is related to riding on the road, but does not relate to the road itself. Typically, an multi-modal asset is a transition point between two different transportation systems. A major consideration for the data relating assets with linear attributes such as roadways, railways and transit systems is having a flexible and robust linear referencing system (LRS). Currently GDOT employs more than one linear referencing method (LRM), and in the future may use global positioning system (GPS) coordinates as a location referencing method.

[0011] While recognized as desirable, no one to date has implemented an open system for storing and retrieving relational and spatial data in a single repository of

road network data. The systems available today do not relate linear, spatial and temporal data in an open system available to third party applications.

BRIEF SUMMARY OF THE INVENTION

[0012] It is therefore provided herein a method and system for providing an open database model that allows the combining of spatial and linear attribute data in a single relational database. The integration of spatial and attribute data allows the data to be accessed by either standard structured query language (SQL) or a GIS application.

[0013] The present invention also provides: enhanced performance by avoiding proliferation of anchor section, or link, segmentation; open dynamic segmentation; integrated temporal data, allowing reporting of historical data; and automated database maintenance to provide consistency among related databases.

[0014] According to an embodiment of the invention, permanent anchor sections are provided to define spatial references. The data model allows for intersections in the interior of a link (anchor section), resulting in a more stable form of a link, or anchor section. The use of anchor sections simplifies maintenance of data associated with the anchor sections and facilitates the use of anchor sections in a distributed environment.

[0015] An embodiment of the present invention implements dynamic segmentation using open data structure built into a commercial-off-the-shelf relational database, e.g. Oracle8i™ or Oracle9i™ available from Oracle Corporation, which

allows access to the data by any user who can access the Oracle® database (Oracle8i™, Oracle9i™, and Oracle® are trademarks of Oracle Corporation). Other types of commercial database systems could be used such as those available from Sybase Corporation of Emeryville, CA (Sybase®) or from Computer Associates, Inc. of Islandia, NY (Ingres II). SQL statements that implement a dynamic segmentation query can be very complex. Therefore, the present invention provides database views that display data in a simple, tabular view that is easier to use and provides an SQL generator that can generate the appropriate SQL statement for a dynamic segmentation query.

[0016] In a further embodiment of the invention, seamless access to a continuous archive of historical data is supported. The historical data is stored in the same format as the current data, but flagged with a time code and status code, indicating that it is old data.

[0017] One complication of an integrated spatial and relational database is maintaining synchronized spatial and relational data. For example, several different maps may be derived from the pavement type (e.g., a map of paved roads, a map of unpaved state routes), and each such map must be modified whenever the pavement type for a section of road changes. Also, the city in which a section of road lies is stored as a relational value (so that this value can be used in relational queries), but it is derived from a spatial representation of the city boundary, and the relational values should be updated if the city boundary value changes. In accordance with the system